

What is claimed is:

1. A stratified air-fuel mixture forming apparatus for an internal combustion engine in which a spark plug is disposed substantially at the center of an upper portion of a combustion chamber, comprising:

a fuel injecting device which forms a fuel spray moving toward a piston reciprocating in a cylinder; and

a control device which controls the momentum of the fuel spray according to a fuel injection amount so that an increase rate of the momentum of the fuel spray in an axial direction of the cylinder is greater than that of the fuel injection amount.

2. A stratified air-fuel mixture forming apparatus for an internal combustion engine according to claim 1, wherein the fuel injecting device forms the fuel spray in a shape symmetric with respect to a cylinder axis.

3. A stratified air-fuel mixture forming apparatus for an internal combustion engine according to claim 1 or 2, wherein the fuel injecting device includes a gas injection valve injecting gas toward the piston, and forms the injected gas and fuel into the fuel spray.

4. A stratified air-fuel mixture forming apparatus for an internal combustion engine according to claim 3, wherein the control device controls a gas injection amount of the gas injection valve according to the fuel injection amount.

5. A stratified air-fuel mixture forming apparatus for an internal combustion engine according to claim 4, wherein the control device controls the gas injection valve so that a ratio of the gas injection amount to the fuel injection amount increases as the fuel injection amount increases.

6. A stratified air-fuel mixture forming apparatus for an internal combustion engine according to claim 3, further comprising;

a gas pressure regulator regulating a pressure of the gas supplied to the fuel injecting device,

wherein the control device controls the gas pressure regulator according to the fuel injection amount.

7. A stratified air-fuel mixture forming apparatus for an internal combustion engine according to claim 6, wherein the control device controls the gas pressure regulator so that the gas pressure increases as the fuel injection amount increases.

8. A stratified air-fuel mixture forming apparatus for an internal combustion engine according to claim 1 or 2, further comprising;

a fuel pressure regulator regulating a pressure of the fuel supplied to the fuel injecting device,

wherein the fuel injecting device includes a fuel injection valve injecting fuel a pressure of which has been regulated by the fuel pressure regulator toward the piston and

the control device controls the fuel pressure regulator according to the fuel injection amount.

9. A stratified air-fuel mixture forming apparatus for an internal combustion engine according to claim 8, wherein the control device controls the fuel pressure regulator so that the fuel pressure increases as the fuel injection amount increases.

10. A stratified air-fuel mixture forming apparatus for an internal combustion engine according to claim 1 or 2, wherein the fuel injecting device includes a fuel injection valve which can change a spray angle and injects fuel toward the piston and

the control device controls the spray angle of the fuel injection valve according to the fuel injection amount.

11. A stratified air-fuel mixture forming apparatus for an internal combustion engine according to claim 10, wherein the control device controls the fuel injection valve so that the spray angle reduces as the fuel injection amount increases.

12. A stratified air-fuel mixture forming method for an internal

combustion engine in which a spark plug is disposed substantially at the center of an upper portion of a combustion chamber, comprising:

- forming a fuel spray moving toward a piston reciprocating in a cylinder; and

- controlling the momentum of the fuel spray according to a fuel injection amount so that an increase rate of the momentum of the fuel spray in an axial direction of the cylinder is greater than that of the fuel injection amount.